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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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Hiroshi Kanno

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EXAMINER

YAMNITZKY, MARIE ROSE

ART UNIT

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/809,804	Applicant(s) KANNO ET AL.	
	Examiner Marie R. Yamnitzky	Art Unit 1774	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 05 March 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-4,7-16 and 18-27 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-4,7-16 and 18-27 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date <u>05 Mar 2007</u> . | 6) <input type="checkbox"/> Other: _____ |

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1. This Office action is in response to applicant's amendment filed March 05, 2007, which amends claims 1, 4, 7, 10, 16, 18-21 and 23, cancels claims 5, 6 and 17 and adds claims 25-27.

Claims 1-4, 7-16 and 18-27 are pending.

2. The references listed on the PTO-1449 filed March 05, 2007 have been considered by the examiner with the exception of the cited office action issued in a corresponding Japanese Patent Application. The cover letter with the IDS indicates that the office action and English language version are attached to the IDS, but it does not appear that these documents were received with the IDS.

3. Most of the issues raised under 35 U.S.C. 112, 2nd paragraph, as set forth in the Office action mailed October 05, 2006 are overcome by amendment. With respect to the scope of "heavy" metal, the examiner referenced claims 1 and 16 as reciting the questioned terminology whereas it was claims 4 and 16 that used the terminology. The term "heavy" has been deleted from claim 16, but remains in claim 4. The term "heavy" should also be deleted from claim 4.

4. Claims 25-27 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The limitations of claims 25-27 are not clear. Relevant text appears to be missing between "wherein" and the formula. (The examiner suggests inserting the phrase --said first

phosphorescent material has a molecular structure expressed by the following formula-- after “wherein” in each of claims 25 and 26; and inserting the phrase --said second phosphorescent material has a molecular structure expressed by the following formula-- after “wherein” in claim 27.)

Claim 25 defines R3 but R3 is not shown in the formula. (Comparing to the formula in original claim 5, “R2” in the formula in claim 25 should be --R3--.)

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

6. Claims 1-4, 12, 15, 16, 18 and 21-27 are rejected under 35 U.S.C. 102(b) as being anticipated by Mishima (US 2001/0053462 A1).

See the entire publication. In particular, see Examples 1-4 and the claims. The devices of these four examples meet the limitations of present claim 1.

Each of the devices of Examples 1-4 comprises tris(2-phenylpyridine) iridium complex, which provides a peak emission wavelength of 515 nm. This peak emission wavelength is within the scope of the peak wavelength range set forth in present claim 2 for the short wavelength light emitting layer. Each of these devices further comprises a different light emitting material that provides a peak emission wavelength within the range of 430 nm to 520

nm, and a different light emitting material that provides a peak emission wavelength within the range of 520 nm to 630 nm. See Table 1 on page 6 for the three peak emission wavelengths of the devices of Examples 1-4.

The device of Example 1 further meets the limitations of present claims 2-4 and 26 wherein the short wavelength light emitting layer and the long wavelength light emitting layer are the same layer.

The device of Example 2 further meets the limitations of present claims 2-4, 15, 16 and 25-27 wherein the short wavelength light emitting layer and the long wavelength light emitting layer are the same layer.

The device of Example 3 contains three separate light emitting layers, and further meets the limitations of present claim 2.

The device of Example 4 contains three separate light emitting layers, and further meets the limitations of present claims 2-4, 15, 16 and 25-27. This device also meets the limitations of present claims 18, 21, 23 and 24 wherein the assisting dopant is not explicitly required to be different from the host material in the short wavelength light emitting layer. The carbazole derivative used as the host material in the phosphorescent layers has hole transport capability and is an amine-based material.

With respect to the ratio of maximum peak luminous intensity as recited in present claims 12 and 22, Mishima does not disclose the ratio for the three peak wavelengths emitted by the exemplary devices. It is the examiner's position that it is reasonable to expect that Mishima's

devices that meet the limitations of claim 3 also meet claim 12, and Mishima's devices that meet the limitations of claim 15 also meet claim 22, since Mishima's devices emit white light.

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. Claims 1-4, 7-16 and 18-27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mishima (US 2001/0053462 A1) as applied to claims 1-4, 12, 15, 16, 18 and 21-27 above, and for the further reasons set forth below.

Mishima does not explicitly disclose the iridium complex named in present claim 7, which encompasses tris(2-phenylquinoline) iridium and derivatives thereof (tris(2-phenylquinoline) iridium and derivatives thereof being recited in present claim 1 as alternatives to a generic "iridium complex"), but teaches that 2-phenylquinoline derivatives may be used. For example, see paragraph [0015] and Examples 2 and 4. The 2-phenylquinoline derivative used in Examples 2 and 4 is an iridium complex having two 2-phenylquinoline ligands and an acetylacetonate ligand, whereas claim 7 requires an iridium complex having three 2-phenylquinoline ligands. It would have been *prima facie* obvious to one of ordinary skill in the art at the time of the invention to utilize iridium complexes of 2-phenylquinoline other than the complex used in Mishima's Examples 2 and 4. One of ordinary skill in the art at the time of the

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invention would have reasonably expected that a tris(2-phenylquinoline) iridium complex could be used for the same purpose as the bis complex utilized in Examples 2 and 4 since Mishima's teachings in paragraph [0015] imply that any iridium complex of substituted or unsubstituted 2-phenylquinoline may be used.

Present claims 8, 13 and dependents require the device to have the layered structure of anode, long wavelength light emitting layer, short wavelength light emitting layer, cathode. Mishima's Examples 3 and 4, which have multiple light emitting layers, have the layers arranged in the order of shortest wavelength light emitting layer closest to anode, and longest wavelength light emitting layer closest to cathode (i.e. the reverse order required by claims 8, 13 and dependents). It would have been an obvious modification to one of ordinary skill in the art at the time of the invention to reverse the order of the light emitting layers without changing the function of the device.

Present claim 8 and dependents further require that the long wavelength layer contain a first assisting dopant having a hole transporting capability.

Present claim 13 and dependents further require that the short wavelength layer contain a second host material and an assisting dopant, and that the assisting dopant be composed of the same material as the first host material, which is the host material in the long wavelength layer.

Present claims 18, 23 and dependents require the device to have the layered structure of anode, short wavelength light emitting layer, long wavelength light emitting layer, cathode. These claims further require the short wavelength layer to contain an assisting dopant having

hole transport capability. Claim 23 further requires the assisting dopant to be the same as the host material in the long wavelength light emitting layer.

Present claim 24 requires each of the long wavelength and short wavelength light emitting layers to contain a host material and a phosphorescent material, with the short wavelength light emitting layer also containing an assisting dopant that is composed of the same material as the host material in the long wavelength light emitting layer.

Claims 11 and 21 further require the assisting dopant to be an amine-based material, an anthracene derivative or an iridium complex.

The carbazole host materials utilized in the phosphorescent layer(s) of Mishima's devices have hole transport capability and are amine-based materials. However, presuming for the sake of argument that the first host material and the second host material of the present claims is not the same material, and that the assisting dopant for a particular layer is not the same as the host material of that layer, Mishima does not provide any examples having different host materials and meeting the claim limitations regarding the assisting dopant(s). Mishima teaches that the light emitting layers may comprise mixtures of host materials. Possible host materials as disclosed in paragraph [0036] include many materials known to have hole transport capability. It would have been within the level of ordinary skill of a worker in the art at the time of the invention to select a suitable combination of materials for use in the light emitting layers from materials known in the art and suggested by Mishima.

With respect to the volume ratio recited in present claims 9 and 19, it would have been within the level of ordinary skill of a worker in the art at the time of the invention to determine

suitable and optimum relative amounts of different components in the light emitting layers in order to provide a functional device and to optimize device performance.

With respect to the relative HOMO energy levels recited in present claims 10 and 20, it would have been *prima facie* obvious to one of ordinary skill in the art at the time of the invention to select combinations of materials having appropriate relative HOMO energy levels so as to affect the movement of holes to the phosphorescent material, the movement of holes to the phosphorescent material being a necessary requirement in order to achieve light emission from the phosphorescent material.

9. Applicant's arguments filed March 05, 2007 have been fully considered but they are not persuasive.

Applicant argues that Mishima fails to disclose or suggest a phosphorescent material selected from tris(2-phenylquinoline) iridium, a derivative of tris(2-phenylquinoline) iridium, or an iridium complex. The examiner respectfully disagrees. Mishima's devices of Examples 1 and 3 utilize tris(2-phenylpyridine) iridium, which is a phosphorescent material that is an iridium complex. Mishima's devices of Examples 2 and 4 utilize tris(2-phenylpyridine) iridium and bis(2-phenylquinoline)acetylacetonate iridium, both of which are phosphorescent materials that are iridium complexes.

It is the examiner's position that even if the claims were to be limited to require that the at least one phosphorescent material include tris(2-phenylquinoline) iridium or a derivative of tris(2-phenylquinoline) iridium, the claims would still be unpatentable over Mishima under 35

U.S.C. 103(a) since Mishima's teachings in paragraph [0015] imply that any iridium complex of substituted or unsubstituted 2-phenylquinoline may be used.

10. Miscellaneous:

In the penultimate line of claim 1, "(2-phenyiquinoline)" should read
--(2-phenylquinoline)--.

A period should be inserted at the end of claim 4.

11. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

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12. Any inquiry concerning this communication should be directed to Marie R. Yamnitzky at telephone number (571) 272-1531. The examiner works a flexible schedule but can generally be reached at this number from 7:00 a.m. to 3:30 p.m. Monday-Friday.

The current fax number for all official faxes is (571) 273-8300. (Unofficial faxes to be sent directly to examiner Yamnitzky can be sent to (571) 273-1531.)

MRY
May 15, 2007



MARIE YAMNITZKY
PRIMARY EXAMINER

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